PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Jess R. Booth et al.	) Examiner: Peter D. Mulcahy
Serial No.:	10/036,159	) Art Unit: 1713
Filed:	December 26, 2001	)
For:	**SYNTHETIC THERMOPLASTIC COMPOSITION, ARTICLES MADE THEREFROM AND METHOD OF MANUFACTURE**	)
Atty. Dkt. No.:	7241-101C1/10209911	)

DECLARATION UNDER 37 CFR § 1.132

I, Jess R. Booth, declare as follows:

1. I am a joint inventor, with Yorem Aisenberg, of the above-identified patent application.

2. A photograph of a 0.125 inch thick plaque-shaped article made of polymethyl methacrylate and 1 % by weight naturally occurring aluminosilicate glass is attached hereto as Exhibit 1. To demonstrate the transparency of the material, the plaque-shaped article is positioned over a sheet of paper which has the words "0.125 Inch Thick Colorless, Transparent Acrylic Plaque With 1.0 Weight Percent Al-Si Glass" printed thereon.

3. The plaque-shaped article was prepared in the following manner. Aluminosilicate glass powder was preblended in a cool, dry state with polymethyl methacrylate (PMMA) pellets. The aluminosilcate glass contained cristobalite and aluminum oxide. The aluminosilicate glass concentration was 1.0 weight percent of the total of the powder and thermoplastic polymer weight. The preblended material was fed into a 30 mm twin screw for melt compounding of the

PMMA and aluminosilicate glass, extrusion, and cutting into pellets. The plaques were made on an injection molding press from the compounded pellets.

4. The refractive index of aluminosilicate glass was determined in the following manner. A few grains of aluminosilicate glass was mixed with refractive-index oil. The mixture was then viewed in transmitted light on a glass slide under a petrographic microscope, which is a standard method of measuring refractive index. The refractive index of the aluminosilicate glass was determined to be 1.495.

5. I hereby declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: 1-07-04

Jess R. Booth

0.125 INCH THICK COLORLESS, TRANSPARENT ACRYLIC PLAQUE WITH 1.0 WEIGHT PERCENT AL-SI GLASS

ENCYCLOPEDIA OF VOLCANOES

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TABLE 1 Physical Properties of Useful Volcanic Materials: Color, Typical Grain Size in a Volcanic Occurrence, Density, Strength (Compressive), Thermal Conductivity, Heat Capacity, and Common Uses[a]

Volcanic product	Color	Typical grain-size	Density (g/cm^3)	Strength (kbar)	Thermal conductivity (kcal/m hr deg)	Common uses
Raw products						
Basaltic scoria	Black to red	Coarse aggregate < 3 cm	1.2–2.5	0.6–1.6	<1.0	Road construction, use in cinder blocks, moderate insulator
Basaltic lava	Black/gray	Massive	2.4–3.1	<2	2.0–3.0	Construction, decorative purposes, moderate insulator
Rhyolite ash	Light gray/brown	Fine aggregate < 2 mm	1.5–2	<0.1	<1.0	Abrasives, creation of perlite, a good refractory, insulator
Pumice	Light gray/brown	Aggregate 0.2–10 cm	0.5–1.5	<0.5	<0.75	Absorbent, abrasives, good insulator
Silicic ignimbrite	Light to dark brown	Massive	2.1–2.8	<1	2.0–3.0	Decorative uses, construction, poor to moderate insulator
Rhyolite lava	Brown to gray black	Massive	2.1–2.8	<25	2.0–3.0	Decorative uses, construction, poor to moderate insulator
Obsidian	Clear black	Small lenses or tears (cm)	2.0–2.5	<11	2.7–3.5	Decorative uses, cutting implements, poor insulator
Native sulfur	Yellow	Microcrystalline	1.95–2.1	<0.1	0.13	Chemical additive, component needed to "vulcanize" rubber
Bentonite clays	Light brown	<0.005 mm	1.8–2.6	<0.1	Varies widely	Additive to drilling muds, good insulator and sealant
Man-made products						
Perlite	White to light gray	Coarse aggregate < 3 cm	0.3–1.2	<0.1	<1.0	Absorbent, insulator, lightweight concrete
Cinder concrete	Gray	Blocks (man-made)	2.0	<0.5	3.0–4.5	Construction, insulation

[a] Where appropriate, a range of values has been given. The values given are typical for the materials shown but there can be considerable variance. For example, basaltic scoria has been observed up to meters in size, though these are typically not used for raw materials. The thermal character of the materials is greatly dependent on physical factors, such as vesicularity, or for aggregates their grain size and spatial relationship to one another.

[redacted]

Nylons

Type →	ASTM	6/6 Nylon: General Purpose Molding[a]	6/6 Nylon: Glass Fiber Reinforced[a]	6/6 Nylon: Glass Fiber, Molybdenum Disulfide Filled[a]	6/6 Nylon: General Purpose Extrusion[a]	6/6 Nylon: High Impact[a]	6/6 Nylon[a]	6/12 Nylon	Mineral filled nylon
PHYSICAL PROPERTIES									
Specific Gravity	D792	1.13-1.15, —	1.37, 1.47	1.37—1.41	1.13, 1.15	1.09	1.07-1.09	1.06-1.08	1.47
Ther Cond, Btu/hr/sq ft/°F/in	—	1.7, —	1.5, 3.3	—	1.7, —	—	1.5	1.5	—
Coef of Ther Exp, 10^{-5} per °F	D696	4.5, —	2.1, 1.4	1.75	—	—	8.3	5.0	2.7-5.0
Specific Heat, Btu/lb/°F	—	0.3-0.5	—	—	0.3-0.5	—	0.3-0.5	0.3-0.5	—
Refractive Index, n_D	D542	Transluc	Opaque	Opaque	Opaque	Opaque	Translucent	Translucent	Opaque
Water Absorption (24 hr), %	D570	1.6, —	0.9, 0.9	0.5-0.7	1.5	—	0.48	0.4	0.5-0.8
Coef of Static Frict (against self)	—	0.04-0.13, —	—	—	—	—	—	—	0.23
MECHANICAL PROPERTIES									
Tensile Strength, 1000 psi	D638								
Ultimate		11.8, 11.2	25, 30	19-22	12.8, 8.8	7.8, 6.0	5.9, 5.0	8.8, 8.8	—
Yield		11.8, 8.5	—	—	12.6, 8.6	—	8.5, 6.5	8.8, 7.4	9-10
Elongation, %	D638								
Ultimate		60, 300	1.8, 2.2	3	90, 240	40, 210	125, 300	160, 340	10-25
Yield		5, 25	—	—	5, 30	—	18, 10	7, 40	—
Mod of Elast in Tension, 10^5 psi	D638	4.75, 3.85	14, 20	—	—	—	2.75, 1.5	—	5.0
Flex Strength, 1000 psi	D790	Unbreak.	28, 35	26-28	—	—	11, 6	—	12-18
Mod of Elast in Flex, 10^5 psi	D790	410, 175	10, 18	11-13	4.1, 1.75	2.55, 1.25	3.0, 1.6	2.9, 1.6	3.3-6.0
Imp Str (Izod notched), ft-lb/in	D256	1.0, 2.0	2.5, 3.4	—	1.3, —	15, 15-26	1.1, 2.0	1.0, 1.4	1.0-1.5
Compr Strength (1%), 1000 psi	D695	4.9, —	20, 24	—	4.9 (1%), —	1.8	—	2.4, —	—
Fatigue Str,[f] 1000 psi	D671								
10^4 cyc		6.5, 3.4[e]	8.0, 9.0[h]	—	—	—	—	—	—
10^5 cyc		5.9, 3.2[e]	6.5, 7.3[h]	—	—	—	—	—	—
10^6 cyc		5.3, 3.1[e]	6.0, 7.0[h]	—	—	—	—	—	—
10^7 cyc		5.2, 3.1[e]	5.9, 7.0[h]	—	—	—	—	—	—
Hardness (Rockwell)	D785	R119, R108	E80, E60	M95-100	R118-108	R112	R111	R114, —	R119-121
Abrasion Res (Taber CS-17, 1000g), mg/1000 cycles	D1044	3-5, 6-8	—	—	—, 3-5	—	—	—, 5.7	12-30
ELECTRICAL PROPERTIES									
Volume Resistivity, ohm-cm	D257	10^{14}-10^{15}	3.5×10^{14}, 2.6×10^{14}	—	10^{15}	10^{14}, 10^{15}	3.3×10^{14}, 2.9×10^{13}	10^{14}, 10^{14}	10^{14}
Dielectric Str (short time), v/mil	D149	385	400, 480	300-400	—	390, 330	540, 380	—	280-465
Dielectric Constant	D150								
60 Hz		4.0, —	4.0, 4.4	—	—	3.2, 3.5	3.6, 5.4	4.0, 6.0	—
1 MHz		3.6, —	3.5, 4.1	—	—	3.1, 3.0	3.2, 3.4	3.5, 4.0	—
Dissipation Factor	D150								
60 Hz		0.014, 0.04	0.018, 0.009	—	—	0.013	0.02, 0.09	—	—
1 MHz		0.04, —	0.017, 0.018	—	—	0.017	0.02, 0.02	0.02, 0.03	—
Arc Resistance sec	D495	120	148, 100	135	120	72, 77	—	—	115
HEAT RESISTANCE									
Max Rec Service Temp, F	—	250-300[f]	250-300[f]	250-300[f]	250-300[f]	—	225-275[f]	350	—
Deflection Temp, F	D648								
66 psi		470	507, 500	—	470	420	330	330	400
264 psi		220	495, 500	—	220	180	140	180	300
CHEMICAL RESISTANCE			Inert to most organic chemicals such as esters, ketones, alcohols and hydrocarbons. Resist alkalis and salt solutions, but att by phenols, formic acid, strong mineral acids and strong oxidizing agents						
APPLICABLE PROCESSING METHODS		Injection molding			Extrusion	Injection molding, extrusion		Injection molding; blow molding, extrusion	Injection molding
USES		Bearings, gears, bushings, coil forms, brush backs, rod, tubing		Mech parts where lubrication is undesirable or diff	Tubing, rod, pipe, sheeting, laminations	Protective helmets, tool handles and housings	Jacketing for wire and cable, special molded parts		Elec housings and mech. parts

[a] Where two values are given, first is for dry, as-molded material, and second for moisture equilibrium in air; single value pertains to dry material unless otherwise noted. [illegible] All values at moisture equilibrium. [illegible] glass fiber. [illegible] stabilized for max heat resistance. [illegible] cyclic failure [illegible] Second value is for material moisture conditioned to 50% relative humidity. [illegible] Values for material moisture conditioned to 50% relative humidity. Zytel ST-801 (DuPont)

Type and Filler →
PHYSICAL PROPERTIES
Specific Gravity
Ther Cond, Btu/hr/sq ft/°F/in
Coef of Ther Exp 10^{-5} per °F
Spec Ht, Btu/lb/°F
Water Absorption (24 hr), %
MECHANICAL PROPERTIES
Mod of Elast in Tension, 10^5
Ten Str, 1000 psi
Elong (in 2 in.), %
Hardness (Rockwell)
Impact Str (Izod notched), ft
Mod of Elast in Flex, 10^5 psi
Flex Str, 1000 psi
Compr Str, 1000 psi
ELECTRICAL PROPERTIES
Vol Res, ohm-cm
Dielec Str (short time), v/mil
Dielec Const
60 Hz
1 MHz
Dissip Factor
60 Hz
1 MHz
Arc Resistance, sec
APPLICABLE PROCESSING ME
HEAT RESISTANCE
Max Rec Svc Temp, F
Deflection Temp, F
CHEMICAL RESISTANCE
USES
Type &
Density, lb/ft³
Ther Cond, Btu/hr/sq ft/°F/in
Coef of Ther. per °F × 10^{-5}
Water Absorption, % vol
Heat Deflection (264 psi), F
Max Rec Service Temp, F
Tensile Str, psi
Ultimate Ten Elong, %
Mod of Elast in Tension, 1000
Compr Str, psi (10%)
Mod of Elast in Compr, 1000
Flex Str, psi
Mod of Elast in Flex, 1000 psi
Shear Str, psi
Mod of Elast in Shear, 1000
Hardness (Shore D)
Impact Str (Izod, unnotched),